CENTRAL INTELLIGENCE AGENCY

INFORMATION REPORT

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SECURITY INFORMATION

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THE SOURCE EVALUATIONS IN THIS REPORT ARE DEFINITIVE.
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(FOR KEY SEE REVERSE)

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[redacted]

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1. [redacted] Zavod 393. This plant is located at a small town called Krasnogorsk (N5551, E3719), a few kilometers from Moscow. [redacted] in the mechanical design section, the services of which were farmed out to any section needing them. [redacted] chief was Ing. Junge, and the section head was Ing. Hermann Schrumpf. 25X1

2. [redacted] the design of a so-called "oxidation oven" for the processing of PbS photocells. These cells were developed in the laboratory of Prof. Dr. Paul Goerlich at Zavod 393 (Sorki). Dr. Goerlich, who led this group, is now at Zeiss in Jena. Working under Dr. Goerlich were Dr. Alfred Gross and Dr. Paul Genswein. These two physicists are now also located at Zeiss in Jena. There was also a Miss Heine, who married Dr. Goerlich. There were two glass blowers in the group, a Werner Hartmann and one Vandenherz. There was a second laboratory parallel to that of Dr. Goerlich, which was staffed by Soviets, and no Germans were allowed in it. The Soviet heading this laboratory was Novitskiy. The work paralleled that of Dr. Goerlich's laboratory, in that a device developed to a certain point in the laboratory of Dr. Goerlich was then passed on to the Soviet staffed laboratory. 25X1

NAVY Review Completed

25 YEAR RE-REVIEW

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3. Among other things Dr. GOERLICH was engaged in was the development of PbS cells. Apparently he had received orders to build an "oxidation oven" for the processing of these cells and he asked Ing. SCHRUMPF to help him. [redacted] the development of an oven. 25X1 The over-all dimensions of the oven were to be 60 by 50 by 40 cm. and it was to contain 12 compartments arranged in six pairs, and each pair was to have a separate heating and temperature control equipment. Doors were to be at each end so that the PbS cells could be inserted at one end and taken out at the other. It was intended that it should be possible to reach a temperature of 800°C in all compartments within 30 minutes, at which time the electrical heating current was to be automatically cut off and the temperature was then to drop to room temperature within the next 60 minutes. There was to be one Cu-Constantan thermo-couple with a hard-glass hot junction insulation and a contact milli-voltmeter for each pair of compartments. There were to be six ceramic supported heating elements, one for each pair of compartments. The oven was designed to operate with a current of 15 amperes [redacted]. This 25X1 prototype oven was, however, never completed, due to the lack of necessary parts. [redacted] completed only one pair 25X1 of compartments, with the exception of the heating element, the ceramic supports of which were not available, when the entire project was taken over by the Soviet counterpart laboratory. [redacted] this oven was to be a prototype for the manufacture of other similar ovens [redacted] 25X1 From the specifications it would seem that about 48 PbS photo-cells could have been processed per day per oven. [redacted] no 25X1 production of the PbS photocells which Dr. GOERLICH's group were developing. [redacted] these PbS 25X1 cells were being designed for an infra-red guidance system for rockets. [redacted] 25X1

4. [redacted] an anti- 25X1 aircraft rocket development program, particularly guidance development work, was being conducted at Sorki. One Otto RITTER reconstructed at Sorki the old World War II development of the Zeiss, Jena, "JUNO". RITTER is now (1953) at Zeiss, Jena. For this development at Sorki, very high speed electric motors were designed for use in the USSR "JUNO". An Ing. Gerhardt LENSKI, who is still at Sorki, had knowledge on this subject and is now working in the Electrotechnical Laboratory at Sorki. [redacted] 25X1 An Ing. Paul BLUME, is also employed in the Electrotechnical Laboratory and a Dipl. Ing. ERHARD is chief of the laboratory. [redacted] 25X1

5. Another device worked on at Sorki was a modification of the Zeiss, Jena, COMMAND SET 45. At Sorki, only a rudimentary form of this device was undertaken. The design for set 45

had been completed in Jena in 1944, and was to have been part of an advanced type of fire control equipment. The equipment designed at Sorki was for use with unfused antiaircraft projectiles, since there was no provision for the introduction of any ballistic data into the device. It was a very conventional and relatively rudimentary form of a lead computing device. It was of the angular travel type of computer with no arrangement for the incorporation of any parallax correction. It could be traversed 360 degrees, elevated 90 degrees, and depressed 10 degrees. The data were transmitted to the gun by an AC synchronous motor pair [redacted] A stereoscopic range finder was incorporated in the device. Four operators were necessary for its operation. The first operator took care of the azimuth tracking telescope while the second was in charge of the elevation tracking scope. The third operated the range finder, while the fourth, who served as the team leader, introduced the changing range figures into the device. [redacted] the device would be practically useless in modern warfare with plane speeds being what they are. One of these command sets was completed at Sorki and was to be used as a prototype for the production of others, [redacted] Ing. Junge was in charge of this project. 25X1 25X1 25X1

6. [redacted] the development of a so-called taumeter, which was a device to measure the response time of the PbS cells, which were presumably to be put into production. /See page 5, which is a schematic diagram of this apparatus, while on page 8 is the detailed drawing of item 4 of the diagram on page 5./ [redacted] This taumeter was almost an exact copy of a similar device, built by Dr. Tolstor, a Soviet physicist in Moscow, who had been working on infrared photocells. [redacted] 25X1 25X1 25X1

7. Among the minor projects [redacted] at Sorki was the development of an aerial photographic negative print device for distortion correction, which presented no new features and worked on the well-known principle of print paper inclination for the correction of some of the distortion. Ing. Schrumpf was in charge of this project. [redacted] Ing. Schrumpf on the design of a "Diopterometer", a device for the measurement of the radius of curvature of spherical or cylindrical surfaces. This instrument was practically a copy of existing designs of lens measures or the Geneva gauge. Other projects [redacted] were the design of a device to prevent double exposures with the commercial photographic shutters, manufactured at Sorki, and the development of a motion picture camera theodolite. [redacted] A large part of the Sorki plant was given over to the production of commercial cameras, which were practically copies of existing Leica and Contax models. A small number of inexpensive commercial cameras were also produced, but no production was planned [redacted] The plant was also producing copies of aerial cameras, [redacted] 25X1 25X1 25X1 25X1 25X1

[redacted] 25X1

8. The various Soviet inspection parties were in civilian clothing, or in Soviet Air Force officers uniforms. General NIKOLAYEV, chief of the designing section of military equipment, maintained an office at the plant. [redacted] 25X1 members of the unorganized group which tended to resist the ideological pressure which was always present. Ing. JUNGE was also a member of this loosely defined group. [redacted] Dr. GENSWEIN and Ing. JUNGE are definitely anti-communistic, [redacted] 25X1 Prof. GOERLICH's leanings, but [redacted] he may not look with too much disfavor on the Soviets. GOERLICH kept himself more or less aloof from the rest of the Germans. His position demanded a fairly close association with the Soviets and he deliberately fostered an air of inscrutability, [redacted] 25X1 In June of 1952, Ing. SCHRUMPF returned to Zeiss, Jena, at which time a reorganization of the "Bildmessung" (plate or picture measuring) department occurred.

9. [redacted] none of the devices or designs [redacted] either at Sorki or after the war at Ziess, Jena, 25X1 are of revolutionary importance, and that the ideas and designs are entirely conventional and in some respects even outdated.

Page 5 - Diagram A: Schematic Diagram of Tau-Meter

Page 8 - Diagram B: Changeable Disk

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Legend for Diagram A.

1. A 12 or 24 volt AC projection lamp, filament, helix: dia. of wire, 0.9 mm; length of helix, 7 mm. Lamp is adjustable in three mutually perpendicular directions.

2. Condensing lens, adjustable axially. Focal length equal to 75 mm.

3. Rotatable disk with two slits 180° opposed. Dimensions 0.1 by 4 mm and 0.3 by 4 mm. Either may be positioned on the optic axis.

3a. Filament image can be formed at plane of disk (4) and can be varied in size from 1:1 to 1:1/3.

3b. Adjusting screws to position longitudinal axis of slit parallel to radius of disk (4).

3c. Rough positioning indent for disk (3).

4. Rotating disk with regularly spaced light interruption slots. Any one of three disks can be mounted here, with 180, 20, or 2 slots. Diameter of disk measured from center of slots is 254 mm and the thickness is 2 mm. The design department's specifications for the accuracy of the angular positioning of the edges of the slots for the 180 slot disk was plus or minus 24" of arc. /Comment: Accuracy of this order of magnitude would have necessitated the use of some sort of an optical position controlled jig-boring machine, comparable to the types of the Societe Genevoise. 25X1 [redacted] the slots were cut on an ordinary milling machine, which was the best compromise available. Linear tolerances of from 0.02 to 0.04 mm, plus or minus, could be obtained with this machine. The slot width was to be equal to the distance between the slots to within the linear tolerance given above. They asked for an angular accuracy of 24" of arc, and obviously only got, using the larger linear tolerance :

$$\sin \theta = \frac{0.04}{127} = 0.000315 \text{ or } \theta = 1'\ 06'',$$ or nearly three times larger.

For the 20 and 2 slot disk, they asked for an angular tolerance of 1.2' of arc and were actually able to achieve this figure./

5. Synchronous motor, continuously adjustable in speed from 6000 to 600 RPM.

6. Electric tachmeter.

7. Vibration damped (rubber) motor mounting.

8. Comparison K photocell with amplifier in shielded housing.

8a. Shielded housing.

9. PbS cell to be tested. [redacted] 25X1

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10. Linear filament (Cr - Ni) lamp. Filament dimensions 10 by 40 by approx. 0.5 mm.

11. Optical bench.

12. "   "

13. Shielded amplifier and electronic equipment.

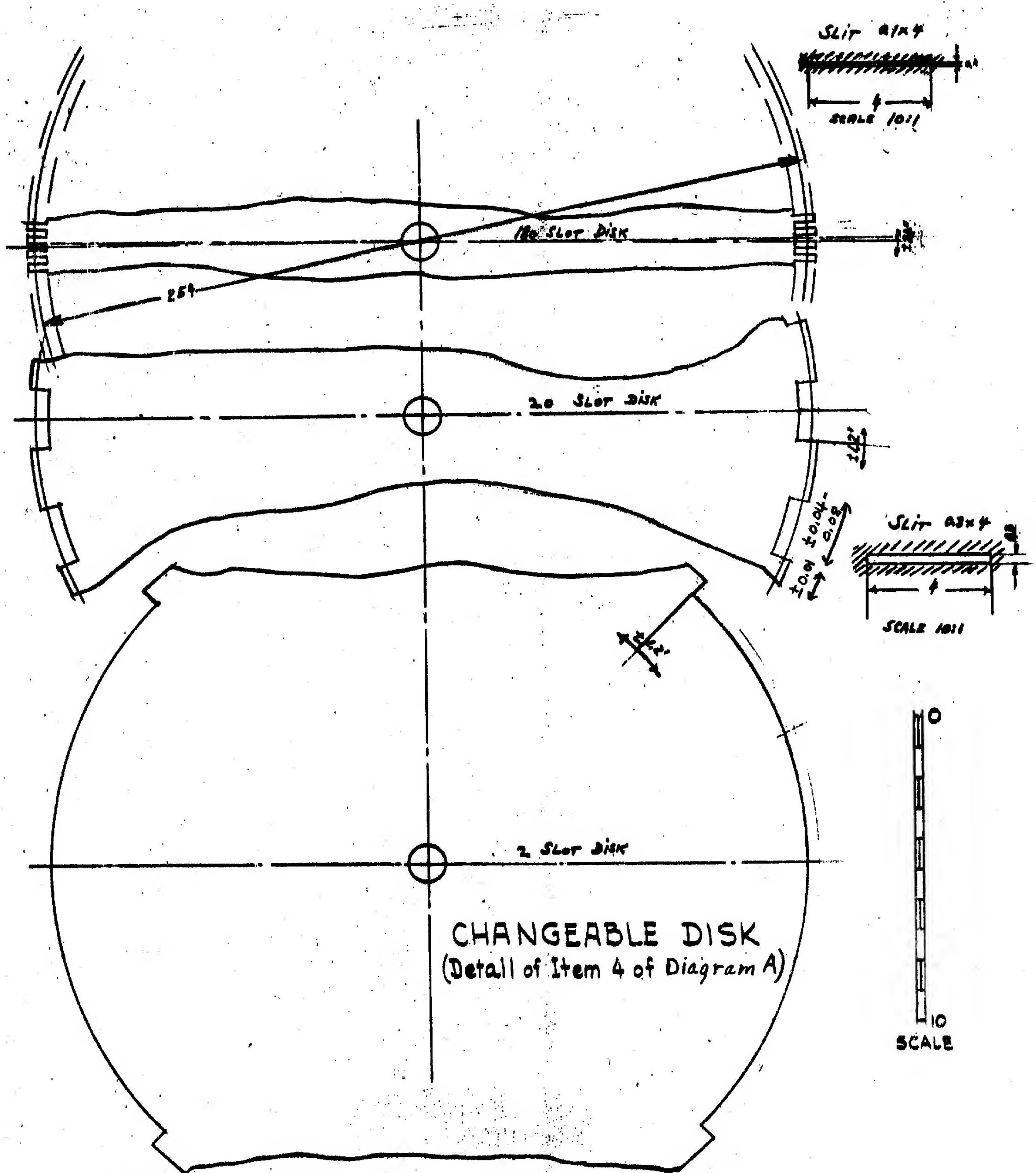
14. Metal housing.

15. "   "

16. Light tight partition.

17. Base plate.

Diagram B


SLIT 0.1x4
4
SCALE 10:1
254
SLOT DISK
20 SLOT DISK
SLIT 0.3x4
4
SCALE 10:1
±0.04-0.08
±0.01
2 SLOT DISK
CHANGEABLE DISK
(Detail of Item 4 of Diagram A)
0
10
SCALE

Legend for Diagram B

1. 180 slot disk. Time required for opening and closing of slot equals 4.4% of the entire illuminated time. The slot could be milled to a maximum accuracy of plus or minus 0.015 mm. From this, the angular error of positioning the edges of the slots is $\tan e = \frac{0.015}{127} = 0.0001181$, or $e = 24.12''$ of arc.

   The error in % with respect to the opening and closing time is $\frac{0.015 \times 100}{0.1} = 15\%$ or,

   with respect to the entire open time, is $\frac{0.015 \times 100}{2} = 0.75\%$

2. 20 slot disk. Time required for opening and closing the slit (width equal now to 0.3) is equal to 1.5%. With the same error with respect to opening and closing time as above, we have:

   15% of opening time represents $\frac{0.3 \times 0.15}{100} = \frac{4.5}{100} = 0.045$mm or with

   respect to entire open time, $\frac{0.045 \times 100}{19 \times 94} = 0.225\%$. This means the angular error may be as large as $\sin \theta = \frac{0.045}{127} = 0.000355$,

   or θ = plus or minus 1.2'

3. 2 slot disk. (0.3 mm wide slit) Opening and closing time of slot equals 0.15%. With conditions as above, 15% of opening time is $\frac{0.3 \times 0.15}{100} = 0.045$ mm, and, with respect to the entire opening time, becomes $\frac{0.045 \times 100}{199.39} = 0.0226\%$. The angular error is the same as with disk 2.

Additional information was given as follows:

With the three disks, we may obtain the following frequencies of light pulses.

a.	180 x 100	equals	18,000 cps
	180 x 10	"	1,800 cps
	20 x 100	"	2,000 cps
	20 x 10	"	200 cps
	2 x 100	"	200 cps
	2 x 10	"	20 cps

The slit width is so chosen that a luminous flux of about 0.1 lumen will fall on the K comparison cell. The diameter of the disk is calculated as follows: The time for the opening and closing of the slit is not to exceed 5% of the total time the slit is open. For a slit width of 0.1 mm, the disk slot width can be found from

$\frac{0.1 \times 100}{5} = 2$ (mm). The circumference at the center of the slot is therefore 2 x 360mm equals 720 mm and the diameter thus becomes 239 mm. The actual diameter was made equal to 254 mm, giving a circumference of 797.56 mm. Slot diameter =

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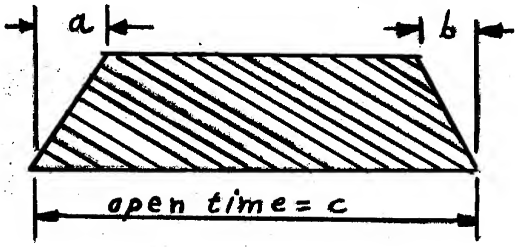
$\frac{797.56}{360} = 2.27$ mm. The time required for opening and closing is thus $\frac{0.1}{2.271} = 0.044$ or 4.4%. With the 20 and 2 slot disk, the 0.3 mm wide slit is used. With the 20 slot disk, we have, slot width $= \frac{797.56}{40} = 19.94$ (mm) and the ratio of opening and closing time to total open time is $\frac{0.3}{19.94} = 0.015 = 0.015 = 1.5\%$.

With the 2 slot disk, we have slot width equals $\frac{797.56}{4} =$ 199.39 (mm) and the percentage figure becomes, $\frac{0.3}{199.39} = 0.0015$ or 0.15%.

The graphical representation of the above argument is illustrated by the following diagram.



$\frac{a+b}{c} = 4.4\%$

Not to Scale

It is obvious, from Diagrams A and B, that this tau meter, instead of measuring the response time as indicated to paragraph 6 of the report, is simply an apparatus for the comparison method of measurement of the frequency response of the PbS photocells, over the frequency range from 18,000 to 20 cps. The fact that this effect would even have to be considered would seem to indicate that, if the cells were to be used in some infra-red control device, a rate of scanning was to be employed at which the frequency response became important.